

WHAT IS CLAIMED IS:

1. A high speed direct mold clamping apparatus of an injection molding machine comprising:

5 a clamping cylinder of a uniform inside diameter, the clamping cylinder including an oil channel portion having at least one grooved oil channel formed therein and a close contact portion formed of a curved surface leaded to the oil channel portion;

10 a clamping ram slidably coupled with the clamping cylinder, and having a first channel for allowing for the flow of oil and a booster cylinder connected to the first channel;

a booster ram slidably coupled with the booster cylinder of the clamping ram and having a second channel leaded to the booster cylinder;

15 a moving platen coupled with one end of the clamping ram;

a stationary platen installed to be opposed to the moving platen;

a first port formed in the oil channel portion for the selective flow of oil;

20 a second port formed in the close contact portion for the selective flow of oil.

2. The high speed direct mold clamping apparatus according to claim 1, wherein the grooved oil channels are arranged
25 radially in the oil channel portion.

3. The high speed direct mold clamping apparatus according to claim 2, wherein the grooved oil channels are arranged in the oil channel portion at a uniform interval.

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4. The high speed direct mold clamping apparatus according to claim 1, wherein the grooved oil channel has a cross section shape selected from a group including arc, rectangle, semicircle and triangle.

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5. The high speed direct mold clamping apparatus according to claim 1, wherein the grooved oil channel is gradually reduced at one end with depth to form a transition portion.

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6. The high speed direct mold clamping apparatus according to claim 1, wherein the clamping ram has a central ram portion slidably coupled with the clamping cylinder and an O-ring arranged around the central ram portion for sealing function.

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7. The high speed direct mold clamping apparatus according to claim 1, further comprising a stationary section for fixing the booster ram and the clamping cylinder in position.

8. The high speed direct mold clamping apparatus according to claim 1, wherein the clamping ram has a central ram portion

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slidably coupled with the clamping cylinder, a front ram portion and a rear ram portion, the front and rear ram portions having a same outside diameter.

5 9. The high speed direct mold clamping apparatus according to claim 1, wherein the clamping ram has a central ram portion slidably coupled with the clamping cylinder, a front ram portion and a rear ram portion, wherein the central ram portion has a tapered portion of a width formed adjacent to the front ram
10 portion.

 10. The high speed direct mold clamping apparatus according to claim 9, wherein the distance from one end of the close contact portion to the second port therein is smaller than
15 the width of the tapered portion.

 11. The high speed direct mold clamping apparatus according to claim 1, wherein the clamping cylinder has a discal front sealing portion for sealing the inside of the clamping
20 cylinder, the front sealing portion having a through hole portion for slidably supporting the clamping ram.

 12. The high speed direct mold clamping apparatus according to claim 1, further comprising a position sensor for
25 detecting the position of the moving platen.

13. The high speed direct mold clamping apparatus according to claim 12, wherein the position sensor includes a position detector fixed to the clamping cylinder and a position
5 dog device fixed to the moving platen.

14. The high speed direct mold clamping apparatus according to claim 1, wherein the clamping ram includes a central ram portion slidably contacting the clamping cylinder, a front
10 ram portion extended forward from the central ram portion and a rear ram portion extended backward from the central ram portion, and wherein the booster ram is extended through an end of the rear ram portion outside the clamping cylinder into the clamping
ram.

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15. The high speed direct mold clamping apparatus according to claim 1, wherein the clamping ram has a central ram portion for slidably contacting the clamping cylinder, a front ram portion and a rear ram portion, and wherein the booster
20 cylinder is arranged within the rear ram portion.

16. The high speed direct mold clamping apparatus according to claim 1, further comprising a fastening element for coupling the one end of the clamping ram with the moving platen
25 by adjusting the length therebetween.

17. The high speed direct mold clamping apparatus according to claim 16, wherein the clamping ram has a plurality of coupling projections at one end, and wherein the fastening
5 element includes a pair of half nuts arranged in the moving platen, capable of coupling with and separating from each other, and each having a plurality of coupling grooves therein corresponding to the coupling projections.

10 18. The high speed direct mold clamping apparatus according to claim 16, wherein the clamping ram has a plurality of coupling projections at one end, and wherein the fastening element includes a rotatable section arranged in the moving
15 platen and rotatable to an angle, the rotatable section having a through hole for allowing the insertion of the end of the clamping ram and coupling grooves formed radially around the through hole.

19. The high speed direct mold clamping apparatus
20 according to claim 1, wherein the control means control oil to be fed from the first port into the clamping cylinder in a position that the moving platen is coupled with stationary platen.